

What is claimed is:

1. A system for measuring muscle strength of a human thumb, comprising:

5       a first structure contacting at least a portion of a  
          back side of the hand;  
          a second structure contacting at least a portion of a  
          palm of the hand, said first and second structures  
          configured to secure the hand in a substantially fixed  
10       position;  
          a ring for receiving a thumb;  
          a load cell comprising electronics to record a force  
          generated by the thumb; and  
          a mechanical assembly linking said ring and said load  
15       cell to transmit the forces from said ring to said  
          load cell.

2. The system according to claim 1 wherein said  
mechanical assembly comprises a threaded shaft and a nut,  
20       and said ring is configured to transmit the force generated  
by the thumb to said threaded shaft and said nut.

3. The system according to claim 2, wherein said  
mechanical assembly further comprises a beam positioned  
substantially perpendicular to said threaded shaft, said  
beam transmitting the load from said threaded shaft to said  
5 load cell.

4. The system according to claim 2, further comprising a  
knob for rotating said threaded shaft to adjust the position  
of said nut on said threaded shaft.

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5. The system according to claim 1, wherein said second  
structure is in a substantially fixed position.

6. The system according to claim 1, wherein said first  
15 structure is movable to secure the hand in the substantially  
fixed position.

7. The system according to claim 1, further comprising:  
a push plate;

at least one push rod contacting said push plate and  
said first structure;

5 a bolt secured to said first structure; and

a handle threaded to negotiate said bolt, wherein upon  
rotating said handle in a first direction, said push  
plate, said at least one push rod and said second  
structure move in a direction to adjustably secure the  
10 hand in the substantially fixed position.

8. The system according to claim 1, wherein said  
electronics provides the capability to at least one of: a)  
display and record forces in at least one of metric and  
15 English units; b) display and record a peak force; c)  
continuously display and record forces generated by the  
thumb; and d) reset the system prior to a next exertion of  
force by the thumb.

9. The system according to claim 1, further comprising a  
20 connection whereby data recorded by said system can be  
transmitted to a computing device.

10. A system for measuring muscle strength of the human thumb, comprising:

means for contacting at least a portion of a back side  
of the hand;

5 means for contacting at least a portion of a palm of the  
hand, said means for contacting the back side and said  
means for contacting the palm configured to secure the  
hand in a substantially fixed position;

means for receiving a thumb;

10 means for recording a force generated by the thumb; and

means for linking said ring and said load cell to

transmit the force from said ring to said load cell.

11. A system for measuring muscle strength of the human thumb, comprising:

- 5 a first plate contacting at least a portion of a back side of the hand;
- a second plate contacting at least a portion of a palm of the hand, said first and second plates configured to secure the hand in a substantially fixed position;
- a ring for receiving a thumb of the hand;
- a load cell comprising electronics to record a force generated by the thumb; and
- 10 a mechanical assembly linking said ring and said load cell to transmit the force from said ring to said load cell.

- 15 12. A system for measuring muscle strength of a human thumb, comprising:
- a clamping apparatus to secure a hand in a substantially fixed position;
- a structure for receiving a thumb of the hand while the hand is in the substantially fixed position;
- 20 a force measuring device to record a force generated by the thumb in at least one of abduction and adduction directions; and
- a mechanical assembly transmitting the force generated by the thumb to said force measuring device.
- 25

13. The system according to claim 12, wherein said force measuring device continuously records forces generated by the thumb over a finite period of time.

5        14. The system according to claim 12, wherein said structure is adjustable with respect to the hand when the hand is in the substantially fixed position.

10        15. A method for measuring muscle strength of a human thumb, comprising:  
              securing a hand in a substantially fixed position;  
              placing a thumb of the hand in a structure that enables  
                  the thumb to generate a measurable force in at least  
                  one of the abduction and adduction directions; and  
15        recording the force.

              16. The method according to claim 15, further  
                  comprising:  
              providing electronics to record the force generated by  
20        the thumb; and  
              providing a mechanical assembly linking the structure to  
                  the electronics to transmit the force from the  
              structure to the electronics.

17. The method according to claim 15, wherein the thumb can move in at least a first direction and a substantially opposing second direction.

5        18. The method according to claim 15, further comprising the step of adjusting the position of at least a portion of the structure with respect to the hand.

10       19. The method according to claim 15, further comprising the step of at least one of:

- a) displaying the force in at least one of metric and English units;
- b) displaying and recording a peak force generated by the thumb; and
- 15       c) continuously displaying and recording forces generated by the thumb.

20       20. The method according to claim 15, wherein the force is recorded by a first system, and further comprising the step of:  
transmitting the recorded force to a second system.

21. A system for measuring muscle strength of a thumb or a finger of a hand, comprising:

a securing apparatus to secure a hand in a substantially fixed position;

5 a structure, connected to said securing apparatus, to receive the thumb or finger of the hand while the hand is in the substantially fixed position via said securing apparatus;

10 a force measuring and recording device, responsively connected to said structure, to measure at least one force generated by the thumb or finger in said structure in at least one of abduction and adduction directions, and record the at least one force to be used in at least one of diagnostic and therapeutic  
15 treatment of the thumb or finger.



22. The system according to claim 21, wherein a quantitative measure of forces generated in pure palmar thumb adduction and abduction to serve as an adjunct to grip and pinch strength in the following conditions:

- 5        osteo-arthritis pre-operation and post-operation;
- rheumatoid arthritis pre-operation and post-operation;
- thumb reconstruction after trauma;
- reconstruction of congenital differences;
- following tendon transfer surgery; and/or
- 10       following tumor resection and reconstruction.

23. The system according to claim 21, wherein said system significantly, substantially and/or completely isolates one or more muscles that are enervated by the motor  
15       branch of the median nerve or terminal motor branches of the ulnar nerve.

24. A method of measuring muscle strength of a thumb or a finger of a hand, comprising at least one of the sequential, non-sequential and sequence independent steps of:

5       securing the hand in a substantially fixed position;  
receiving the thumb or the finger of the hand in a force  
measuring device;  
measuring the force generated by the thumb or the finger  
in at least one of the abduction and adduction  
10       directions; and  
transmitting the force generated by the thumb or the  
finger to be used in at least one of diagnostic and  
therapeutic treatment of the thumb or finger.

15       25. The method according to claim 24, wherein a  
quantitative measure of forces generated in pure palmar  
thumb adduction and abduction serve as an adjunct to grip  
and pinch strength in the following conditions:  
osteoarthritis pre-operation and post-operation;  
20       rheumatoid arthritis pre-operation and post-operation;  
thumb reconstruction after trauma;  
reconstruction of congenital differences;  
following tendon transfer surgery; and/or  
following tumor resection and reconstruction.

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26. The method according to claim 24, wherein one or more muscles that are enervated by the motor branch of the median nerve are significantly, substantially and/or completely isolated.